

Water Quality Excerpts

Proposed Changes to the Revised Phase II Report

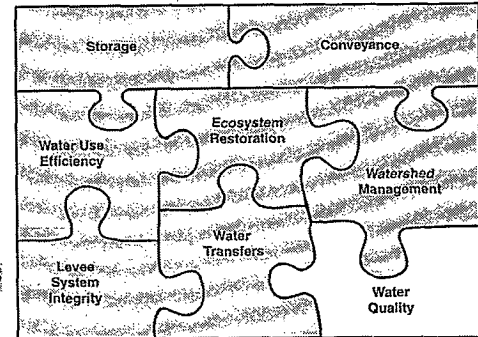
December 8, 1998



**CALFED
BAY-DELTA
PROGRAM**

Water Quality Program

The draft Water Quality Program includes programmatic actions to further CALFED is committed to achieving continuous improvement in the Program's goal quality of providing good water quality for environmental, agricultural waters of the San Francisco Bay-Delta estuary until no ecological, drinking water, industrial, and recreational or other beneficial uses of water the waters are impaired by water quality problems, and to maintaining this quality once achieved. While some actions are sufficiently developed for early implementation, others rely on comprehensive monitoring and future research to improve our understanding This objective extends to the watersheds of effective water quality management and to control the estuary to the extent that water quality problems at their sources in these watersheds affect beneficial uses dependent on the estuary. -



Determining impairment to "Continuous" as used here means a water quality beneficial use is often difficult and complicated steady or step-wise trend over the 30-year time horizon of the CALFED Program, and does not include short-term fluctuations that may be brought about by wet or dry hydrologic conditions, other shorter term, temporary, events or time needed to initiate and implement improvement measures. For some beneficial uses, such as drinking water Although specific water quality targets have been established to gauge the success of the Water Quality Program, CALFED commits to seeking water quality that exceeds these targets where feasible and agricultural water use, impacts on use are generally well characterized cost effective. -

For other beneficial uses such as The Water Quality Program contains numerous actions directed at improving the quality of water to support ecological resources and to protect CALFED investments in ecosystem use, impacts on species are not as well characterized restoration projects. - The Program has relied on Other program actions are directed at improving the technical expertise of a variety of stakeholders to define approaches to solving water quality of Delta waters to support problems agricultural and recreational uses of the resource. - The Water Quality Program actions include Drinking water supply is another important beneficial use of Delta waters, as the Delta is a combination source of research, pilot studies, and targeted activities. This approach allows actions drinking water to be taken on known water quality problems and sources of those problems, while allowing further monitoring and research of potential problems and solutions about two-thirds of the State's population. Drinking water elements of the Water Quality Program are emphasized in this section because, unlike other water quality aspects, drinking water issues have great significance to the selection of a Preferred Alternative.

Water Quality Targets

For many water quality parameters, numerical and/or narrative objectives for the protection of ecological and other beneficial uses already exist in water quality control plans adopted by the State and Regional Water Quality Control Boards. The CALFED Water Quality Program has adopted regulatory objectives where appropriate as its targets for water quality improvement, such as for selenium and mercury. For some water quality parameters, objectives do not presently exist. This is particularly true for drinking water that receives further treatment prior to use (see page ____). As the Water Quality Program evolves, it is anticipated that periodic re-evaluation of water quality targets will be one feature of adaptive management as applied to this program.

With respect to drinking water beneficial uses, the CALFED objective is to continuously improve source water quality that allows for municipal water suppliers to deliver safe, reliable, and affordable drinking water that reliably meets, and where feasible, exceeds applicable drinking water standards. CALFED program actions will be aimed at reducing the levels of bromide, organic carbon, and pathogens in Delta drinking water sources. CALFED's target for providing safe, reliable, and affordable drinking water in a cost effective way is to achieve either: a) average concentrations at Clifton Court Forebay and other south and central Delta drinking water intakes of 50 ug/L bromide and 3.0 mg/L total organic carbon; or b) an equivalent level of public health protection utilizing a cost effective combination of alternative source waters, source control, and treatment technologies.

Continuous improvement of Central and South Delta water quality from current average conditions will be achieved, concurrent with construction of the first bundle of Stage I projects.

Enabling Delta water users to substitute higher quality source water for Delta water offers important opportunities to provide safe drinking water, and will be intensively investigated as a Stage 1 approach within the CALFED Program. However, because source water substitution is probably not feasible for all drinking water supplies from the Delta, the importance of developing adequate source water quality in the Delta cannot be ignored. Furthermore, single-purpose solutions such as source water substitution may not provide as comprehensive and robust a solution as a statewide solution.

In seeking to meet its commitment to provide urban agencies with water sufficient in quality to produce safe and affordable drinking water that meets and, where feasible, exceeds standards for public health protection, CALFED will consider additional water management options including, but not limited to, provision of alternate sources, use of storage facilities to improve drinking water quality, and an isolated facility to provide source water of better quality. The degree of improvement needed, if any, will be determined based on developments in treatment technologies, future regulatory directions and results of new health effects studies. CALFED plans an active role in fostering development of the information that will make such

determinations possible.

An important feature of drinking water supplies taken from the Delta is higher bromide concentrations than are found in the drinking water supplies of about 90% of the nation. Bromide (a salt) reacts with disinfection chemicals to form harmful chemical byproducts that have increasingly raised health concerns for consumers. Most of this bromide comes from the ocean as a result of its connection with the Sacramento-San Joaquin Bay-Delta estuary, and will continue to impact the quality of water exported by the state and federal projects.

Therefore, unlike most of the other water quality parameters of concern to CALFED, the choice of CALFED conveyance options can profoundly influence concentrations of bromide and other salts in Delta waters. The bromide question is, therefore, inseparably linked to conveyance and other water management options to improve source quality within the CALFED program. See *Conveyance*, p. ____.

Program Actions

The Water Quality Program has relied on the technical expertise of a variety of stakeholders to define approaches to solving water quality problems, and to develop programmatic actions to meet CALFED objectives. While some actions are sufficiently developed for early implementation, others rely on comprehensive monitoring, pilot studies, and research to improve our understanding of effective water quality management and to influence future actions to control water quality problems at their sources. This approach allows actions to be taken on known water quality problems and sources of those problems, while allowing further monitoring, research, and testing of potential problems and solutions. Actions will be adapted over time to ensure the most effective use of resources.

In summary, the draft Water Quality Program component includes the following broad categories of programmatic actions:

- **Drinking Water - Increase source water quality and treatment technology to reduce potentially toxic and carcinogenic disinfection by-products by controlling Parameters** - Reduce the loads and/or impacts of bromide, total organic carbon (TOC), pathogens (controlling inputs from rangelands, nutrients, salinity, and turbidity dairies, and confined animal facilities), through a combination of measures including source reduction, alternative sources of water, treatment, and storage and bromides. The quality of drinking water supplies taken from the Delta will be improved conveyance improvements.
- **Pesticides** - Reduce impacts of pesticides (including diazinon and chlorpyrifos) through development and implementation of Best Management Practices, for both urban and agricultural uses, and support of pesticide studies and pilot projects for

regulatory agencies while providing education and assistance in implementation of control strategies for the regulated pesticide users.

Organochlorine pesticides - Reduce the load of organochlorine pesticides in the system, including residual DDT and Chlordane/chlordane, by reducing runoff and erosion from agricultural lands through Best Management Practices. Sediment control will also protect valuable topsoil and prevent costly maintenance of drainage systems.

Trace Metals - Reduce impacts of trace metals such as copper, cadmium, and zinc in upper watershed areas, near abandoned mine sites. Reduce impacts of copper through urban stormwater programs and agricultural Best Management Practices. Study the ecological impacts of copper in the Delta. Determine the feasibility of copper reduction.

Mercury - Reduce mercury in rivers and the estuary by source control at inactive and abandoned mine sites.

Also, study bioavailable mercury levels in the current mercury levels in the river/water, sediment and fish in the estuary, rivers and its potential threat to human health affected tributaries.

Implement comprehensive monitoring and research program to determine loadings and sources of total and methyl mercury, transport of mercury in sediment, factors affecting mercury transformation and bioaccumulation in the estuary, and concentrations of mercury in indicator species. Use this information to prioritize remediation or cleanup of mercury sources.

Salinity-Selenium - Reduce salinity/selenium impacts through reduction of leaching of agricultural land via irrigation improvement/loads at their sources, crop selection/increased flow, and changes in land use/assimilation of discharges with flow. Turbidity and Sedimentation - Reduce turbidity and

Further research is needed for some water quality problems.

For example, for some parameters of concern, such as mercury, not enough is understood about its sources, the bioavailability of mercury to various species, factors contributing to its bioavailability, and the load reductions needed to reduce fish tissue concentrations necessary for human consumption. For example, as to mercury, not enough is understood about the relative contribution of various mercury sources, factors affecting the transformation of mercury from one form into another (particularly the formation of methyl mercury, the most bioavailable form); specific control measures that will reduce the levels of bioavailable mercury within the estuary; and, ultimately, the level of load reductions needed to reduce fish tissue concentrations to levels that will render the fish safe for human consumption. In addition, research is needed to determine what effect wetlands restoration activities will have on the bioavailability of mercury in soils in these restoration areas.

Salinity-Selenium - Reduce salinity/selenium impacts through reduction of leaching of agricultural land via irrigation improvement/loads at their sources, crop selection/increased flow, and changes in land use/assimilation of discharges with flow. Turbidity and Sedimentation - Reduce turbidity and

Sedimentation - which affect several hydraulic areas in the Bay Delta and its tributaries, including treatment of drinking water sources:

Selenium - Reduce selenium, through irrigation control, crop selection, and possibly land

fallowing or land retirement. Impacts of selenium will be further reduced by real-time management of selenium laden agricultural drain water released to the San Joaquin River to minimize concentrations in the river when selenium discharges occur.

- Reduce imports of salt and study non-agricultural source contributions. Salinity reductions in the river would also incorporate real-time management of salt discharges. San Joaquin drainage problems have been evaluated in several studies over the past two decades. Complete resolution of the San Joaquin drainage problems is beyond the scope of the CALFED Bay-Delta Program. In the San Joaquin drainage problems have been evaluated in several studies over the past two decades. Reduced loads would be accomplished through implementation of on-farm and district source control measures, development of treatment technology, land retirement through CVPFA, and possible extension of the Grassland Bypass Use agreement or similar arrangements. Complete resolution of the increased flow will result from FERC actions on San Joaquin drainage problems is beyond the scope of River tributaries and implementation of the CALFED Bay-Delta Program VAMP. Selenium impacts from industrial sources in the Susan Bay will be reduced by improved source control.

Selenium - Reduce selenium, through irrigation control, crop

selection, Salinity - Actions are planned to reduce salt sources in urban and possibly land fallowing or land retirement industrial waste water to protect drinking and agricultural water supplies, and to facilitate development of successful water recycling, source water blending, and groundwater storage programs. - Impacts of selenium will be further reduced by real-time management of selenium laden agricultural drain water released to For the San Joaquin River watershed, a strategy should be developed using a continuous monitoring technology to minimize concentrations in water quality impacts of salt movement through river when selenium discharges occur the system.

This strategy will be consistent with CVPFA and VAMP requirements. CALFED will not pursue resolution of salinity problems of the San Joaquin Valley through a San Joaquin Valley Drain, which is beyond the scope of the CALFED Program. Long term solutions will be sought through the San Joaquin Valley Drainage Implementation Program, with CALFED support.

Salinity in the Delta will be controlled both by limiting salt loadings from its tributaries, and through managing sea water intrusion by such means as using storage capability to maintain Delta outflow and to adjust timing of outflow, and by export management.

Turbidity and Sedimentation - Reduce turbidity and sedimentation which affect several hydraulic areas in the Bay Delta and its tributaries, including treatment of drinking water sources:

impacts of sedimentation. Control sedimentation in several watersheds to protect spawning beds and maintain capacity of streams.

- **Low Dissolved oxygen** - Reduce impairment of rivers and the estuary caused by substances that exert excessive demand on dissolved oxygen. Oxygen depleting substances are found in waste discharges, agricultural discharges, urban stormwater, sediment, and algae.
- **Toxicity of Unknown Origin** - Through research and monitoring, identify parameters of concern in the water and sediment within the Delta, Bay, Sacramento River and San Joaquin River regions and implement actions to reduce their toxicity to aquatic organisms.

Bromide and Organic Carbon Management

An analysis (currently under peer review) of bromide and organic carbon sources in Delta drinking water supplies was undertaken to develop a realistic expectation of what level of reductions in bromide and organic carbon concentrations might be expected as a result of Water Quality Program actions. This analysis indicates that the Pacific Ocean and the San Joaquin River are the most important sources/predominant source of bromide in Delta waters. Further analysis of the San Joaquin River indicated that about 80% of the bromide found there can be accounted for by bromide entering the Delta through the Central Valley Project pumps at Tracy. Evidence suggests that other sources of bromide, such as pesticide use in the Valley or natural sources in San Luis Reservoir are not as important; therefore, it appears that a large majority of bromide found in the San Joaquin River is from recirculated Delta water containing bromide from the ocean. This bromide analysis indicates that, because bromide in Delta drinking water supplies comes mostly from the ocean, it is probably not possible for water quality actions to reduce bromide concentrations by more than 20% at best.

Water flowing through the Delta to municipal water intakes picks up additional organic carbon. Studies have demonstrated that a majority of this added carbon comes from drainage off Delta islands.

Organic carbon, unlike bromide, is subject to removal, at least to some extent, through conventional water treatment processes. While a number of practical problems would affect the feasibility and economics of reducing organic carbon to acceptable levels, it appears to be at least theoretically feasible to meet this objective through water quality program actions involving land and water management and treatment either on Delta islands or at treatment plants, and relocation of agricultural discharges away from municipal supply intakes.

Other management actions could include timing of diversions, separation of drinking water supplies, and blending with higher quality source waters. Storage capability can provide important flexibility for enabling these water management actions to be successful. Further

studies will be required to more fully quantify the results of potential water quality actions, and to establish the feasibility of implementing these actions.

Storage can help timing for release **Coordination Between CALFED and Other Responsible Agencies**

Success in achieving the CALFED water quality objectives through the CALFED Water Quality Program will depend upon close coordination and collaboration between the State Water Resources Control Board, Regional Water Quality Control Boards, California Environmental Protection Agency, California Department of Health Services, U.S. Environmental Protection Agency, and other responsible State and Federal agencies, in implementation and regulation of water diversions. Improved conveyance to south Delta export pumps depend upon close coordination and collaboration between the State Water Resources Control Board, Regional Water Quality Control Boards, California Environmental Protection Agency, California Department of Health Services, U.S. Environmental Protection Agency, and other responsible State and Federal agencies, in implementation and regulation of water diversions. Water use efficiency measures can improve water quality entering the Delta by reducing some agricultural and non-agricultural discharges containing pollutants. In 1999, CALFED will establish a working group of stakeholders and agency representatives to identify appropriate linkages, develop specific coordination mechanisms, and regulatory actions to assure the Delta water quality goals. Water use efficiency measures can improve water quality entering the Delta by reducing some agricultural and non-agricultural discharges containing pollutants. In 1999, CALFED will establish a working group of stakeholders and agency representatives to identify appropriate linkages, develop specific coordination mechanisms, and regulatory actions to assure the Delta water quality goals.

Wastewater reuse depends on high quality water **Relation to prevent salt damage** **Other Program Elements**

Other components of irrigated land or corrosion of industrial equipment the CALFED Program can affect water quality.

Potential benefits of Surface storage can help in the Water Quality Program include:

management of flows and improve water quality by providing additional storage for higher quality, wet period flows and for blending. As previously discussed, improved conveyance to south Delta export pumps can substantially improve water quality for those diversions. However, such changes have the potential to change the quality of water in Delta channels, either for the better or worse. Water use efficiency measures can improve water quality entering the Delta by reducing some agricultural and non-agricultural discharges containing pollutants, but also have the potential to decrease water quality. Ecosystem restoration actions may degrade drinking water quality by increasing organic carbon loads; therefore these actions will need to be structured so as to assure adverse water quality impacts do not occur.

Water quality can affect the ability to expand water use efficiency measures such as conservation, wastewater reuse, and conjunctive use, all of which depend on the availability of high quality water to prevent salt damage of irrigated land or groundwater basins, prevent

corrosion of industrial equipment, and to achieve blended water salinity objectives.

In the event of a catastrophic levee failure in the Delta, the amount of saline water entering the system could be such as to make Delta waters unusable for many months. Besides making the water unusable for agricultural, industrial, or domestic purposes, it could also destroy delicate ecosystem balances and ruin CALFED investments in ecosystem restoration. Therefore, it is difficult to overestimate the importance of a successful Delta levee program to achieving and maintaining good water quality for the beneficial uses of Delta waters.

The CALFED Comprehensive Monitoring, Assessment, and Research Program (CMARP) will be the primary vehicle for measuring the extent to which continuous water quality improvement is achieved. Performance will be measured by comparing ambient water quality (where appropriate) to specific water quality objectives that have been established for the parameters of concern. An independent panel established to evaluate the progress of the Stage 1 water quality actions against objectives will also provide oversight of the CMARP effort as part of its reports to CALFED and the California legislature.

More information on the water quality program will be included in the revised *Water Quality Program Plan*.

Program Plan:

Improves the potential for wastewater reclamation to improve water use efficiency. Reduces concentration of compounds contributing to disinfection byproduct formation potential and degradation of drinking water supplies improves drinking water quality and public health benefits improves water quality for the ecosystem by reducing toxicants as a limiting factor improves Delta water quality by reducing the volume of urban and agricultural runoff/drainage and concentration of pollutants entering the Delta

Water Use Efficiency (WUE) Program

Stakeholder Focus Group Status Report 12/8/98



CALFED
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PROGRAM



Program Overview

Emerging Package:

- Incentive-based approach ⇔ ■ Assurances (reopening regulation)
- Local planning w/ AVMC ⇔ ■ Measurable objectives

Strategic plan as vehicle

Significant Stage 1 Actions

1. Develop Measurable Objectives
2. Develop Baseline/Reference Conditions
7. AVMC Evaluation of Agricultural Water Management Plans
12. Agricultural Financial Incentive Program
14. Water Measurement Program

Need Resolution in 12/98

Water Measurement:

- Geographic Level
- Financial assistance level
- Precision Level
- Groundwater

Assurances:

- Access to CALFED benefits
- Linkage to Storage/convey.
- Regulation (reopening)

Role of AVMC:

- Who sets the goals
- Indep. review

Need Resolution in '99

- Gain broader stakeholder support
- Broader environmental support of AVMC
- Define Measurable Objectives
 - Related to process/effort
 - Related to water diversion/application
- Refine cost estimates
- Better establish linkages to other programs

Next Steps

- Summarize today's comments /direction
- 12/9 morning conference call
- Report back to Babbitt/Dunn: 12/9 ?
- Final meeting: 12/11
- WUE Scientific Review Panel: 12/14-16
- Define nature of Focus Group or successor in '99